SECTION 26 - PLANTING SPECIFICATIONS

26-1 PART 1 GENERAL

26-1.1 Scope of work

A. The work includes the furnishing of all labor, materials, plants, seed, fertilizer, soil amendments, tools, equipment, transportation, and the performance of all work required to prepare the soil and plant the lawns, together with maintenance of the planted lawns and cleaning up of the site, all as shown on the plans and as specified in these Specifications, the Special Provisions, and as directed by the Engineer.

B. Site Protection: The contractor shall adequately protect the site, and the work, erecting barricades, construction fences, or other implementing other protective methods as needed for protection of the job site during both the construction and maintenance period. Replacement and/or repair of any materials, including the labor to effect the work shall be completed at the contractors sole cost at no additional cost to the City. The contractor shall also protect the adjacent property, and the public, from operations or acts that may damage or harm either, and shall be responsible for any damage, injury or loss due to the contractor's acts or negligence as determined by the City.

26-1.2 Testing And Inspection

A. After rough grade is approved by the Engineer, the Contractor shall provide agronomic soils testing by a laboratory approved by the City for public landscape areas. The Contractor shall submit test results with soil amendment recommendation to the Engineer for review and approval. The Contractor shall amend soil, prepare backfill and fertilize per Section 26-2.2, unless soils test recommendation would cause an unhealthy growing environment..

B. Soil depth in median island areas is to be determined by digging or drilling 1.5 in (5') deep test holes at locations to be selected by the inspector. Any asphalt, concrete, road base, or other debris that is encountered is to be removed and replaced with approved topsoil throughout the entire area to be planted.

C. Planting work shall be subject to special inspections by the Engineer including, but not necessarily limited to, the following items:

1. Grading
2. Imported soil and soil amendments prior to incorporation into work.
3. Soil fumigations or weed control operations prior to planting.
4. Placement and arrangement of plant materials prior to planting.
5. Condition of plant material prior to placement.
6. Digging and preparation of plant pits for trees.
7. Planting and staking of trees.

D. All overtime inspection charges incurred by City personnel shall be paid by the Contractor when inspection services are required outside of normal working hours. Work requiring inspection before or after the normal 8 hours of a normal working day or taking place on holidays Saturdays and Sundays will be considered overtime inspection.

E. A final inspection of the work shall be made by the City Inspector and Parks Division in the presence of the Contractor, at the time when all landscaping and irrigation work is completed. The Contractor shall provide 48 hours notification in advance of such inspection. Prior to the final inspection, the Contractor shall have prepared and transmitted to the City a record set of "as-built" drawings of the landscaping and irrigation work. No final inspection will commence without the "as-built" drawings of the landscaping and irrigation work. No final inspection will commence without the "as-built" drawings.

F. In the event that the Contractor schedules an inspection and has not completed the work that is to be inspected or made an effort to do so, the Contractor will be billed for the cost of the inspection and must remit~it the cost prior to final approval and inspection of the work.

26-2 PART 2 MATERIALS / EXECUTION

26-2.1 Plant Material

A. In all cases, materials shall be furnished as needed to complete work in quantities designated on the construction plans or these Specifications, including turf reseeding, redressing and maintenance during construction and the maintenance period. The Contractor shall provide upon request valid invoices to verify amounts of various materials to be used.

B. All plant material shall conform to the requirements of the Agricultural Code of the State of California, these Specifications and the Special Provisions. All plant material shall be grown in nurseries that have been inspected by the State Department of Agriculture and have complied with its regulations.

C. Plant nomenclature shall be defined by the list of plant materials on the Landscape Planting Plan. All trees, shrubs, and other plants shall be the variety and size shown on the plans, and shall conform to the requirements herein. All trees, shrubs, and other plants shall be tagged with their botanical and common plant name in accordance with recommendations of the American Association of Nurserymen.

D. Substitutions for the indicated plant material will be permitted, provided the substitute materials are approved in advance by the Engineer, and the substitutions are made at no additional cost. All substitute plant material shall conform to the requirements of these Specifications unless otherwise approved by the Engineer.

E. All plant material shall be symmetrical, typical for variety and species, sound, healthy, vigorous, free from plant disease, insect pests or their eggs, mechanical injury, excessive abrasions, or other objectionable disfigurements, and shall have healthy, normal root systems, well filling their containers, but not to the point of being root b76ound. All plant material shall have a habit of growth that is normal to the species, and be sound, healthy, and vigorous. Tree trunks shall be sturdy and well hardened off. Trees Ad shrubs shall not be pruned prior to delivery except as authorized by the City. In no case shall trees or shrubs be topped.

F. All plant material shall have normally well developed branch systems with straight stems, well balanced tops of vigorous growth and vigorous and fibrous root systems which are not root bound. Root condition of plants will be determined by the City of Fresno removal of earth from the roots of at least two (2) plants but not more than 2% of the total number of species or variety from each source.

26-2.2 Grading And Soil Preparation

A. Before soil preparation is to begin, the entire area that is to be planted shall be finish graded to lines and grades established by the Engineer or as indicated in the construction plans or Special Provisions. Filled area shall be sufficiently compacted to prevent settlement when watered. Areas to be cut, or to receive fill, shall have the topsoil stripped and stockpiled before the grading operations begin. After completion of the grading operations, the topsoil is to be replaced in planted areas (lawn and planters). Topsoil stripped from areas to be paved is to be stockpiled and replaced in planted areas. The Contractor is responsible to remove excess soil from the site, or import additional topsoil -if needed, at no cost to the City.

1. Top soil: shall be fertile, friable, natural loam, free of subsoil, clay lumps, brush, weeds and other litter, roots, stumps, stones larger than 1" in any dimension, and other extraneous or toxic matter harmful to plant growth. Contractor shall submit a soils analysis of the proposed top soil (see 26-1.2) to be imported for the work for review and acceptance by the City of Fresno ***BEFORE*** delivery to the job site.

2. Fill soil: Upon approval by the City of Fresno, soil from the job site, free of subsoil, clay lumps, brush, weeds and other litter, roots, stumps, stones larger than 1" in any dimension, and other extraneous or toxic matter harmful to plant growth may be used as fill soil in the project landscape areas. Contractor shall compact all landscape fills to a maximum of 85% after grading, in areas designated for planting only. All other areas shall be compacted per structural requirements of the paving or facility. Top soil, as described in 26-2.1A may also be used as fill soil at the contractor's option. Imported fill soil shall be pre-tested and approved by the City of Fresno as described above

3. Placement of top soil and fill soil:

    a. Top soil (if required to be imported for the job): Minimum depth in lawn areas shall be an even depth of six [6) (.5 feet)] inches deep in all landscape areas to be turfed.

    b. All other landscape areas: May be graded and built up with fill soil (or top soil at the contractor's option) as needed to achieve proper grades and lines as denoted on the project grading plans.

    c. Landscape mounds and berms: If called for, may be formed with fill soil or top soil as described in 26-2.2.

B. The soil shall not be worked when the moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in the air or that clods will not break readily. Water shall be applied if necessary to provide ideal moisture for filling and for planting as herein specified.

C. All areas specified for planting shall be ripped to a depth of at least 20 cm (8") so the soil is loose and friable.

D. In turf areas, the top 7.5 cm (3") of the surface soil shall be cleared of all concrete, stones, roots and similar objects larger than 2.5 cm. (1") in length, wire, sticks and other foreign material. Areas to be seeded shall be evenly graded to present a smooth and even surface free of humps and hollows. Immediately prior to seeding, the surface of the area to be planted shall be sufficiently loose and friable to receive the seed.

E. The Contractor shall legally dispose of all debris.

F. Soil Amendment: shall be a mixture of humus, wood fibers, organics and a maximum of 50% digested, centrifuged biosolids capable of passing through a 3/8" screen, Earthwise Organics' AGRI-YIELD, Kellogg's Nitro Humas or approved equal. Amendment shall be licensed with the California Department of Food and Agriculture and shall be certified as an organic compound under the California Organics Food Act of 1990 and shall be defined as a Class A material as defined by the US EPA 40 CFR 503. *Contractor shall submit laboratory analysis for review and approval by the City of Fresno before delivering any material proposed as "Amendment" to the job site*.

G. Soil amendments: Soil amendments shall be evenly spread and incorporated into all areas designated for planting at the following rates:

   1. 4.5 cubic yards (CY) per 1,000 SF which will result in a nominal soil amendment depth of 1 ½ ", over all areas designated for the planting of ornamental ground covers, shrubs, trees, and turf (see plans).

   2. Spread fertilizer and other macro/micro-nutrients over all planting areas designated for planting along with the amendment (where applicable) and incorporate into the soil during the tilling process.

H. Tilling and Incorporation of Amendments: Amendment and fertilizer shall be thoroughly tilled into the soil by rototilling, discing, or other means to a minimum depth of eight (8) inches. *This tilling/incorporation process shall be completed separately and after the soil ripping process, and after all major site work has been completed in order to minimize further compaction of the planting areas.*

I. Fertilizer application requirements during construction: The following fertilizers, micro nutrients, and other additives shall be applied by the Contractor to the soil.

   1. 6 lbs of actual/elemental Ammonium based Nitrogen (percentage by weight) per 1,000 square feet (261 lbs/acre) shall be applied to the surface of all landscape planters ***after completion of the planting operations*** if the Nitrogen source is of a dry granular variety.

   2. In the hydraulically seeded areas of the lawn, the Nitrogen shall be applied during the seeding operations as a highly concentrated liquid Nitrogen with a guaranteed analysis of 30-0-0 labeled as Monterey Chemical's Monterey N-SLO 30, Hydro Agri's UREA or approved equal. The concentrated liquid nitrogen shall be formulated of 4.5% Urea Nitrogen, and 25.5% water soluble Methylene Urea (Salt Index = 0%) with a minimum formulation of 3.1 lbs of Nitrogen per gallon of liquid N-SLO 30. N-SLO 30 shall be applied at a rate of 2 gallons per 1,000 SF (87 gallons per acre).

3. 1 lb of elemental/actual Phosphorus (percentage by weight) per 1,000 square feet shall be broadcast onto the soil amendment (***after*** the amendment is spread throughout the planters) and tilled into the earth during the ground preparation operations. Phosphorus in the form of P2O5 will ***not*** be accepted for use on the job site.

4. 1 lb of elemental/actual Potassium (percentage by weight) per 1,000 square feet shall be broadcast onto the soil amendment (***after*** the amendment is spread throughout the planters) and tilled into the earth during the ground preparation operations. Potassium in the form of muriate of potash (K Cl) will ***not*** be acceptable for use on the job site.

5. Additional micro nutrients may be specified by the City after the rough grading operations are completed. Any additional applications of chemicals will be contracted by the City in writing as additional work.

6. The fertilizers, micro nutrients, and other additives (excluding the application of nitrogen as described above) shall be incorporated into the soil at the time of incorporation of the soil amendment. Nitrogen shall be surface applied at the conclusion of the planting operations or during the hydraulic seeding process.

7. Some of the planter areas are irrigated with Sub-surface drip irrigation (SDI), and no automatic overhead irrigation is available in these locations. These areas, irrigated with SDI shall be hand irrigated one time in order to move the nitrogen into the soil. The contractor shall thoroughly saturate the soil so that the water visibly stands on the surface without washing the seed and soil out onto the adjacent pavement

J. The Contractor shall finish grade all planting areas below the surfaces of all adjacent walks, curbs, mow strips, paved areas, etc., to the depth specified below, in all cases without abrupt changes in gradient:

Turf Areas	15 mm (½")
Tree Areas	40 mm (1 ½")
Shrub and Ground Cover Areas	25 mm (1")

26-2.3 Weed Control

A. The Contractor shall notify the City of site conditions prior to planting. All existing weeds shall be removed and/or eradicated as determined by a licensed Pest Control Advisor (PCA) in writing. The Contractor shall verify the method of weed control employed whether by fumigation, chemical methods, mechanical methods or others as determined by a licensed PCA in writing. The Contractor shall use and apply weed control materials in accordance with manufacturers' recommendations and all local codes and ordinances. The materials shall be applied by a licensed applicator.

B. The Contractor shall consistently use recommended weed control methods throughout the construction period. The Contractor will not allow weeds to become established or persist in any portion of the project.

C. Prior to beginning the 90-day maintenance period, the Contractor shall apply pre-emergent herbicide at the recommended rate on all non-turf areas. The City may

require an application of pre-emergent herbicide to turf areas if it is determined to be necessary.

26-2.4 Planting

A. Seeding/Planting shall not commence until all construction work, clearing and grubbing, grading soil preparation and irrigation system installation is complete. In addition, the functioning irrigation/sprinkler system shall be connected to a permanently installed City water meter prior to any seeding/planting work.

B. No planting activities are to proceed until the irrigation system is 100% complete and approved by the City.

C. Planting pits shall be dug as required for the individual plant. No plant material shall be planted if the root ball is broken or cracked either before or during the process of planting. Once set, the root ball shall be scored to a depth of 2.5 cm (I ") to prevent circling roots.

D. Plants shall be set so that each plant shall bear the same relation to soil level when planted as it did when in container. Generally, trees and shrubs should be set with the top of the root ball approximately 2.5 cm (I") above the finish grade. Each plant shall be placed in the center of the plant pit.

    Each plant pit shall be backfilled with the following prepared soil mix:

    1. 50% clean native soil.
    2. 50% Agri-yield or approved equal.
    3. Agriform plant tabs, or approved equal.

E. Backfill material in planting pits shall be tamped firm and a shallow basin formed around the plant to hold enough water to saturate the root ball and backfill. Water plants immediately after planting.

F. After plants are set and backfilled, area shall receive mulch as a top dressing as required for the individual plant. Mulch shall be "Walk-on-Bark".

26-2.5 Turf

A. Lawn Seed Mixture

    Seed shall be of the quality and mixture specified. Before packaging, the seeds shall be mixed together in a mechanical mixer to obtain thorough dispersion of the various types of seeds. Date on certification tag shall be within five (5) months of the planting date.

B. Two lawn seed mixtures shall be used (determined by planting season) and are designated as Winter Mix and Summer Mix.

Winter Mix with percentages by weights:

C. FP&R #1 shall be designated as a "winter" mix and shall be used when the seeding is done between September 15 through April 1.

Seeding rate shall be 12 lbs/1,000 SF (523 lbs/acre). Percentages by weight shall be:

Pinnacle Perennial Ryegrass:	35% (4.25 lbs/1,000 SF)
Creeping Red Fescue:	35% (4.25 lbs/1,000 SF)
Cheyene Bermuda Grass:	30% (3.50 lbs/1,000 SF)

In addition, the contractor shall provide the City with the equivalent of 0.001 kg/m^2 (2 lbs/1000 sq. ft.) "Yuma" Bermuda grass for over-seeding during summer months. Should the maintenance period extend into the summer season, the contractor shall be required to plant Bermuda grass in accordance with the following seeding rate.

Summer Mix with percentages by weights:

D. **FP&R** #2 shall be designated as a "summer" mix and shall be used when the seeding is done between April 1 through September 15. Seeding rate shall be 12 lbs/1,000 SF (523 lbs/acre). Percentages by weight shall be:

Pinnacle Perennial Ryegrass:	20% (2.4 lbs/1,000 SF)
Cheyene Bermuda Grass:	80% (9.6 lbs/1,000 SF)

E. The above percentages do not include crop seed, inert matter, etc. All seed shall be delivered to the work site in sealed containers with the vendor's tag of certification attached to each container. These shall remain attached to the containers and no seed shall be planted, except in the presence or at the direction of the Engineer. The Engineer reserves the right to take samples from each container for testing to verify certification and conformance with the California State Seed Law and Regulations.

F. The Contractor shall notify the City of Fresno prior to the application or reapplication of the seed.

26-2.6 Turf Fertilizer

A. **Commercial fertilizer shall be added evenly to the soil at a rate per thousand square feet to apply approximately 0.45 kg (I lb) of actual nitrogen.** The Contractor shall apply fertilizer a minimum of times. The first fertilization is to occur within 7 days of the first mowing. The second will occur 60 days thereafter. The commercial fertilizer shall be homogenous pellet form of a long lasting type of turf fertilizer consisting of both ammoniac and organic nitrogen, phosphorus, potassium (potash), sulfur, and minor elements of iron, zinc, and manganese.

B. The commercial fertilizer shall be Granulated (14-7-33), with an application rate of 0.04 kg/m2 (8 lbs per 1,000 sq. ft).

Ammoniac Nitrogen	4.00%
Organic Nitrogen	10.00%
Total Nitrogen	14.00%
Available Phosphoric Acid	7.00%

Soluble Potash			3. 00%
Sulfur		7.00%	
Iron	1.60%		
Zinc	0.15%		
Manganese			0.15%

26-2.7 Planting Turf seed

A. Hydroseeding is the preferred method for planting turf seed.

B. Hydraulic equipment used for the application of the fertilizer seed and slurry of prepared wood mulch shall be of the "Super Hydro-seeded" type. The equipment shall have a built-in agitation system and operating capacity sufficient to agitate, suspend and homogeneously mix a slurry.

Application rate for hydro-mulching is as follows:

Wood Mulch	0.2 kg/m^2	= 40 lbs/1000 sq.ft.
Long Lasting Fertilizer (14-7-3)	0.05 kg/m^2	= 10 lbs/1000 sq.ft.
Seed Mixture (Summer Mix)	0. 1 kg/m^2	= 20 lbs/1000 sq.ft.
(Winter Mix)	0.04 kg/m^2	= 8 lbs/1000 sq.ft.
Mulch Binder (Mulch Tackifier)	0. 0 1 kg/m^2	= 2 lbs/1000 sq.ft.

C. For some projects, direct sowing of turf seed may be approved by the City. In these instances, the soil is to be moistened prior to seeding. The turf seed will be distributed in an even, uniform manner. Combinations of turf seed varieties will be prepared and evenly mixed prior to the application of the seed. The seed will be planted using a mechanical seeder such as a "Brillion" drill or a Culti-Pack type device. Broadcast-type equipment may be used only for over seeding in established turf areas.

D. The seed beds shall be kept continually moist after turf seed planting. The time interval between "water off' and "water on" irrigation is to be governed strictly by the amount of surface moisture.

26-2.8 Planting Sod

A. Turf areas may be planted by the installation of sod when approved by the City. The variety of sod will be a premium quality, dwarf turf-type tall fescue. The variety of sod is to be submitted to the City in writing for approval.

B. Procedure for installation of Sod will be as follows:

1. Sod must be installed within 8 hours of delivery to the job site. Protect stored or unused sod from damage by heat, sunlight, or any other adverse condition.
2. Handle sod with care. Torn pieces must have ends cut straight. Pieces smaller than 6l cm (24") in length are to be used only for patching or repairs.

3. Lay sod evenly in a staggered pattern of strips, so that the roll ends are consistently at different locations. Lay and fit sod so that all end joints and cuts are free of voids. Sod will be flush with finished grade of adjacent walkways, curbs or other hardscaped areas.

4. Tamp each roll into position against adjacent strips to eliminate gaps, openings or uneven joints.

5. Trim sod to conform to turf area shapes. Expose all sprinklers and valve boxes. Provide a clean straight edge.

6. Roll all sod areas immediately after installation to remove air pockets and provide complete contact between sod and soil.

7. After installation, irrigate sod completely to provide optimum moisture throughout the period of establishment.

26-2.9 Watering

A. After approval of the turf planting operations by the City, the Contractor shall , without flooding, maintain moisture in all planted areas. The areas shall not be watered to the extent of saturating the soil and causing seed "flotation" or "flowing" of the top surface of the soil. After water has once been applied, no portion of the seeded areas shall be allowed to dry out during the entire germination period. The Contractor shall be responsible to alter the watering times and frequencies to meet site conditions. Irrigate sod thoroughly, so that moisture penetrates through the sod into the soil. Use of a penetrating agent is advised.

26-2.10 Turf Grass Establishment Period

A. The turf grass establishment period begins with the first mowing. The first mowing shall not commence until the grass is generally at least 5 cm (2") but less than 7.5 cm (3") high. For the second mowing and all subsequent mowings, the mower shall be set to cut at the height of 3.9 cm (1-1/2").

B. Between the fifteenth (15th) day and the twentieth (20th) day of the establishment period, the Contractor shall reseed the spots or areas in which normal germination of the seed is not evident. At the end of thirty (30) days of the establishment period, the Contractor shall do the following: reseed all spots or areas where normal seed germination is not evident; remove all rocks or other debris that would constitute a hindrance to subsequent mowings; repair all damage done by his operations; fill all depressions and eroded channels with sufficient top soil to raise to the proper grade, compact lightly and reseed the filled areas; and roll all seeded and reseeded areas with a 58 kg (125 lb) weight roller to firm the soil around the grass roots and to provide a smooth and even mowing surface. Following the thirtieth (30th) day and the ninetieth (90) day of the establishment period, the lawn shall be maintained by mowing at least once every seven (7) calendar days. Maintenance shall also include repairing and reseeding damaged areas, as directed by the Engineer. Upon satisfactory completion of the above points, reseeded areas will be accepted by the Engineer provided all other provisions of these specifications have been complied with by the Contractor. Turf shall be maintained in a weed free condition. Weeds in turf areas will be removed and/or eradicated as recommended by a licensed Pest Control Advisor (PCA) in writing. The turf grass establishment period may overlap with the ninety (90) day maintenance period.

26-2.11 Trees

A. (15 gallon) Tree Standard

Trees shall be at least 2.0 cm (3/4") in diameter, measured 15 cm (6") from the container soil level. Tree height shall be at least 1.82 m (6') measured from the container soil level.

B. Spacing

When trees are spaced in rows, the total dimension shall be verified and the trees equally spaced within the designated area. Where trees are shown in an informal pattern, the Contractor shall space the material as shown maintaining an unequal spacing as shown on the plans and as directed by the Engineer.

C. The Contractor is to ensure that the spacing of trees conforms with the following minimum spacing guidelines. Trees shall be planted:

1. 10 m (3 0') from street corners and stop signs.
2. 5 m (15') from alleys.
3. 3 m (10') from driveways.
4. 6 m (20') from light poles.
5. 5 m (15') from power poles.
6. 3 m (10') from fire hydrants.
7. 2 m (6') from concrete improvements, unless otherwise shown on the plans.
8. 2.5 m (8') from sewer lines.
9. 1 m (3') from gas and electrical lines.
10. 1 m (3') from water lines.
11. 1 m (3') from telephone and cable television lines.
12. 6 m (20') from other acceptable trees.
13. 1 m (3') from adjoining property line.

D. When tree spacing conflicts with the above guidelines, the Contractor is to recommend alternate locations, and contact the Engineer for a ruling.

E. As designated on the plans. If not designated on the plans, and reference is made to these specifications, root barriers shall be manufactured by DeepRoot, Century Products or approved equal. Linear root barriers shall be a minimum of 12 inches deep. If located in City parkway strip or parking lot planting islands, the barriers shall be placed on each side of the tree, one section against the back of curb, and one section against the front of the sidewalk. In planting islands, the barrier shall completely encircle the island. The necessary length shall be per the as built conditions in the field. A single drainage hole shall be punched into the barrier to accommodate the drainage hole(s) in the parking lot islands as depicted on the plans. At a minimum, the root barriers shall be constructed of sections of ribbed plastic or polyurethane material. Ribbed portion shall be facing toward the tree roots. Both round and linear root barriers shall be placed at the same finish grade as the adjacent paving surface, or if no pavement finish grade is evident, place top of root barrier panel one (1) inch above finish grade. Provide manufacturers standard as LB 12-2: root barrier up against the sidewalks, mow strips and slabs and other similar type of hardscape applications.

26-2.12 Drainage Holes and Backfilling for Trees

A. Subsurface soil and conditions may require drainage holes for proper tree development as determined by the Engineer. The Contractor shall provide the required drainage holes by means of drilling as specified herein. A minimum waiting period of twenty (20) days after drilling shall be completed before any planting can begin. (The Contractor will be responsible for locating all underground utilities.)

26-2.13 Requirements for Drilling

A. One (1) drainage hole, minimum diameter of 60 cm (24"), shall be drilled for each tree to be planted as designated on the Plans.

B. The depth of the drainage hole shall be determined as follows:

1. The hole must penetrate through and beyond any underlying paving material or hardpan soil stratum. All paving material shall be removed from the drilled hole.

2. The hole shall be drilled to a depth where visual evidence of the subsurface sand or gravel drainage stratum is apparent.

3. If there is no apparent drainage stratum, the drainage hole shall be drilled to a minimum of 3 m (10') deep.

C. After drilling is completed, native soil is to be backfilled in lifts into the hole using the following procedure:

1. Replace 60cm (24") of soil.

2. Thoroughly saturate the backfill with water.

Continue this process until the backfill is complete.

26-2.14 Tree Pits

A. Tree pits shall be dug with level bottoms, width twice the diameter of the root ball and 30cm (12") deeper than length of root ball for deciduous and broadleaf trees and coniferous trees.

26-2.15 Tree Fertilizer

A. During the planting operation, apply (21 gram 20-10-5) Agriform or Best-Tabs planting tablets or approved equal, as follows:

B. Position the plant in the hole and backfill halfway up the root ball.

C. Place the recommended number of tablets evenly around the perimeter of, and immediately adjacent to the root ball at a depth which is between the middle and the bottom of the root ball. Completely backfill, tamp firm the soil, and water.

Apply Agriform Plant Tablets or approved equal as follows:

(1gallon) container plants - 1 tablet
(5 gallon) container plants - 3 tablets
(15 gallon) container plants - 6 tablets
(24") box container plants - 10 tablets

26-2.16 Tree Staking

A. Stake coniferous evergreen trees with 1 Lodge Pole Pine specified stake on the NW (windward) side of the tree. Stake deciduous and broadleaf trees with 2 Lodge pole pine stakes, I NE and I SW (perpendicular to the wind) from the tree. Stakes should be vertical, approximately 0.3 m (12") from the tree, and at least 0.3 m (12") into native soil below bottom of tree pit. Stake top

should be below crown of the tree.

1. Provide soft rubber hose tree ties with an enclosed spring loaded action as manufactured by Alden Enterprises "Wonder Tree Ties, V.I.T. Products “Cinch Tie or approved equal. Ties shall be attached to tree stake as shown in staking detail on the plans, with the wire portion of the tie securely attached to the stake (to prevent slippage) via staples, nails, or other means. Ties shall hold tree loosely, and not bind tree too rigidly to the stake, allowing an average of 7 ½ cm (3") of movement in any direction after tree has been tied. Ties shall also be installed so as to straighten trunks to a perpendicular position (to the ground plane) so they are vertically straight. Place all stakes as directed by the City, or if not directed, place parallel to typical wind direction for the area.

2. Provide tree guards as designated on the plans. If not designated on the plans, and reference is made to these specifications, tree guards shall be placed around the base of all tree trunks/stems in both lawn, ground cover, and shrub areas to protect the tree from mechanical damage. Guards shall be of a flexible, expandable, self opening type, a minimum of 23 cm (9") high, and have the capacity to protect a tree with a minimum basal trunk diameter of 10 cm (4").

26-2.17 Mulching

A. Mulch as top dressing all tree basin areas with "Walk-on-Bark" to a depth of 5 cm (2"). Mulched tree basins shall be a minimum of thirty 8l cm (32") in diameter. Do not engulf the trunks of the trees with humus.

26-2.18 Establishment Period

A. Maintain all basins around trees at a 7 ½ cm (3 ") depth.

B. Tree stakes that for any reason are damaged or rendered inadequate for support shall be replaced to their original condition.

C. Maintain trees in their natural shapes. Tall or scraggly branches shall be thinned out where necessary. In no case shall trees be trimmed by heading or shearing. Any plants severely pruned in this manner shall be removed and replaced at Contractor's expense.

D. In all turf areas, maintain a ½ m (1 ½ ft.) diameter grass free area around each tree. Install arbor guard trunk protective device, or approved equal, on each tree.

26-2.19 Shrubs

A. When shrubs are spaced in rows, the total dimension shall be verified and the plants equally spaced within the designated area. Where shrubs are shown in an informal pattern, the Contractor shall space the material as shown on the plans, and as desired by the Engineer.

B. Maintain a minimum of 1.0 m (3') of clearance between shrubs and hardscaped features such as sidewalks, curbs, fences, or any such fixture.

C. Shrub pits shall be dug with level bottoms, width twice the diameter of root ball and 30cm (12") deeper than length of root ball.

D. During the planting operation, apply (21 gram 20-10-5) Agriform or Best-Tabs planting tablets, or approved equal, as follows:

E. Position the plant in the hole and backfill halfway up the root ball.

F. Place the recommended number of tablets evenly around the perimeter of, and immediately adjacent to the root ball at a depth which is between the middle and the bottom of the root ball. Complete backfilling, tamp firm the soil, and water.

Apply Plant Tablets as Follows:

1 gallon container plants - I tablet
5 gallon container plants - 3 tablets
15 gallon container plants - 6 tablets

26-2.20 Mulching:

A. Mulch as top dressing all shrub basin areas with "Walk-on-Bark" to a depth of 5 cm (2"). Mulched shrub basins shall be a minimum of IV). 60 cm (24") in diameter. Do not engulf the stems of the shrubs with humus.

B. Establishment Period, Maintain all basins around shrubs at a 7 ½ cm (3") depth,

C. Shrubs shall be maintained in their natural shapes. Overlong or scraggly branches shall be thinned out where necessary. In no case shall shrubs be trimmed by heading or shearing. Any plants severely pruned in this manner shall be removed and replaced at the Contractor's expense.

26-2.21 Ground Cover

A. Where plant material is shown in an informal pattern, the Contractor shall space the material as shown at all times, maintaining spacing as shown on the plans and as desired by the Engineer. Ground cover material shall be planted in a random pattern and not in straight rows.

B. Ground cover shall be planted sufficiently deep to cover all roots, and spaced as specified in ground cover list on Landscape Planting Plan. At the time of planting all ground cover plants, the earth around each plant shall be firmed sufficiently to force out all air pockets. Alternate procedures in the planting of ground covers shall be approved by the Engineer, but shall not release the Contractor from the noted guarantee described herein.

C. Mulch as top dressing all ground cover basin areas with bark to a depth of 5 cm (2"). Bark shall be "walk-on-bark" as manufactured by Fred Horn, Inc., or approved equal.

D. Fertilize ground cover areas as needed during maintenance period.

26-2.22 Tree Transplanting

A. Tree Preparation:

1. Root pruning: All root pruning shall be performed in accordance with "ISA Pruning Standards" (International Society of Arboriculture). Prune all roots to a depth of 60cm (24")

Pruning location shall be 15cm (6") inside the tree spade circumference. Pruning shall be performed at least thirty (30) days prior to anticipated spading date, or as directed by the Engineer. All pruning cuts shall be clean cut. Any torn root endings shall be trimmed back to create clean cuts.

2. Thinning: Trimming objectives shall be to reduce foliage 10% - 25%, to remove crossing branches, and to remove branches that will interfere with future branch spacing. All cuts shall be performed in accordance with "ISA Pruning Standards". All cuts shall be clean with no ragged edges and shall be made just outside the branch collar. Tree wound dressing shall not be applied to the newly exposed wood. Trimming shall be to a branch no smaller than one-half the size of the branch being removed. Limbs with diameter larger than one-quarter the diameter of the trunk, or branches larger than 15 cm (6") shall not be removed unless said removal has been determined by the Engineer to be necessary to provide tree spade access.

3. Root Ball: The soil shall be moderately moist; damp enough to encourage root tip development, but not so wet as to be unnecessarily heavy.

4. A chalk mark (or in the event of expected rain, an inconspicuous dot of marking paint) shall indicate due north.

B. New Site Preparation:

1. Requirements for Drilling: One (1) drainage hole, minimum diameter of 60cm (24"), shall be drilled for each tree to be transplanted as designated on the drawings. The Contractor will be responsible for locating all underground utilities.

   The depth of the drainage hole shall be determined as follows:

2. The hole must penetrate through and beyond the underlying paving material or hardpan soil stratum. All paving material shall be removed from the drilled hole. The hole shall be drilled to a depth where visual evidence of the subsurface sand or gravel drainage stratum is apparent.

3. If no sand or gravel drainage stratum is apparent, the drainage hole shall be drilled to a minimum of 3m (10') deep.

C. After drilling, water and native soil shall be placed at 60cm (24") intervals, until all soil is replaced. A minimum waiting period of twenty (20) calendar days, after drilling, shall be completed before any planting is begun.

1. Requirements for Backfill: A hole shall be excavated to a depth of 1 m (3') and to a diameter so as to create a planting hole extending 1 m (3') beyond the spaded root ball. Any loose hardpan shall be removed from the planting hole. If different layers of soil exist, each stratum shall be loosened and replaced at the same level.

   a. Native soil shall be used for all backfill during site preparation. Backfill shall be watered in, and allowed to settle for minimum of twenty (20) days. Additional native soil shall be added as necessary to maintain ground level during the settling period.

   b. Contractor shall spade root ball hole on day of transplanting.

   c. Add peat moss to receiving hole in the quantity listed on the chart below. The peat

moss should be mixed thoroughly in the new hole with enough water such that when the root ball is inserted the peat moss will be forced up around the root ball.

PEAT MOSS RATIO TO ROOT BALL SIZE

Root ball Size	Peat Moss
45 cm - 60 cm (18" - 24")	0.01 m^3 (½ cubic foot)
60 cm - 81 cm (25" - 32")	0.02 m^3 (3/4 cubic foot)
81 cm - 102 cm (33" - 40")	0.03 m^3 (1 cubic foot)
104 cm - 127 cm (41 " - 50")	0.04 m^3 (1 ½ cubic feet)
127 cm - 152 cm (51 " - 60")	0.06 m^3 (2 cubic feet)
152 cm - 213 cm (61 " - 84")	0.08 m^3 (3 cubic feet)
213 cm - larger (85" and larger)	0.11 m^3 (4 cubic feet)

D. Transplanting

1. **Tree spade** shall be centered around tree. Cuts made by spade shall be clean: spades shall close at base of root ball; twisting shall be avoided during the removal of the rootball. Any torn roots shall be trimmed such as to create a clean cut.

2. The root ball shall be protected from drying during holding and transported to the new site. Protection shall be accomplished by clear plastic shielded from the sun, or by regularly wet burlap. Provision shall be made to dampen the root ball should holding conditions threaten to allow it to dry out.

3. Limbs shall be tied from the top down as required to prevent injury during handling.

4. Tree shall be oriented at new location such that the original north orientation is maintained. It is especially important to avoid reorienting trees that have been grafted.

5. Tree shall be placed at original soil depth.

6. Agriform or Best Tabs plant tabs, or approved equal, 21 gram 20-10-5, shall be placed every 60 cm (24") along the circumference of the root ball 15 cm (6") below the soil line. Backfill material shall be tamped in on all sides of root ball. A berm shall be constructed 60 cm (24") outside the root ball to create a watering basin. Basin shall be filled with water repeatedly, and backfill probed with a pole to remove all air pockets.

7. Evergreen trees, or deciduous trees in leaf, shall be sprayed with an anti-desiccant as directed and approved by the Engineer.

E. Staking and Guying:

2. Tree shall be staked and guyed from three different equidistant points, one of which should be in line with prevailing winds. The tree shall be protected from direct contact with the cable.

   a. Smaller trees 76 cm - 127 cm root ball (30"-50") shall be anchored with wooden stakes and soft wire.

   b. Larger trees (greater than 127 cm (50") root ball) shall be anchored with 3 mm or 5 mm (1/8" or 3/16") cable and earth anchors.

c. Tie white surveyor's tape at breast height to each cable.

F. Mulching:

1. "Walk-on-bark" mulch approved by the City to a depth of 7 ½ cm (3") shall cover the soil surface at a diameter 60 cm (24") wider than the drip line of the tree in order to improve water retention in the soil and to moderate soil temperatures in the summer.

26-3 PART 3 CLOSE OUT

26-3.1 Clean-up

A. After all planting operations are completed, the Contractor shall remove all trash, excess soil, empty plant containers, or other accumulated debris, from the site at no extra cost to the City. Contractor shall repair all scars, ruts or mars in the area caused by work operations. Areas shall be left in a neat and orderly condition. All this work shall be at the Contractor's expense.

26-3.2 Maintenance Period

A. The Contractor shall continuously maintain all areas included in the work during the progress of the work, through all establishment periods and until acceptance of the work by the Engineer for maintenance.

B. After all irrigation/landscape work indicated on the drawings or herein specified has been completed, inspected, and approved by the Engineer, the City will issue written approval to the Contractor to commence a ninety (90) calendar day maintenance period.

C. Maintenance period work includes, at a minimum on a weekly basis, all litter pickup and removal, watering, mowing, edging, weeding, plant replacement, mulching, cultivating, pest and disease control, and trimming necessary to bring the planted areas to a healthy growing condition and any additional work needed to keep the areas neat and attractive. During the maintenance period, the Contractor shall be charged prevailing rates for all water used.

1. Inspection Intervals & Rejection of Work: During the progress of the maintenance period, the Contractor and the City of Fresno shall conduct inspections at no less then 30 day intervals to determine that ongoing maintenance activities have been conducted by the contractor. If in the opinion of the City, ongoing maintenance has not been conducted by the contractor in a satisfactory manner, the work shall be rectified and/or completed by the contractor and the maintenance period shall begin over again. When reviewed, if landscape maintenance work does not comply with requirements, replace rejected work and continue specified maintenance until reviewed by City and found to be approved. Remove rejected plants and other materials promptly from project site. Contractor is fully responsible for coordinating with the City closely so that work passes re-inspection.

D. Prior to the final inspection, the Contractor will apply a pre-emergent herbicide at the recommended rate.

The maintenance period will cease and begin anew any time the Contractor fails to adequately water, replace unsuitable plants, control weeds or perform other work necessary for the proper establishment of all new landscaping.

E. During the maintenance period, any plant indicating weakness or probability of dying shall be replaced at the Contractor's expense. Constant diligence shall be maintained to prevent disease, insects, and/or rodent infestations and proper preventative or control measures shall be taken. All areas included in the work shall be substantially clean and free of debris and weeds. All plant materials shall be live, healthy and free of infestations.

F. Any erosion or slipping of soil caused by watering shall be repaired at the Contractor's expense.

G. All walks, curbs and gutters shall be kept clear of debris, mud, dust and standing water by sweeping, mopping or hosing down as required for complete cleanliness.

26-3.3 CLOSEOUT / GUARANTEE

A. All plant and lawn areas shall be guaranteed as to growth and health for a period of one (1) year after acceptance of the work for maintenance (at the end of the maintenance period).

B. Any areas that are not healthy and growing shall be replaced under this section at no additional cost to the City.

C. The Contractor, within seven (7) days of written notification by the City, shall remove and replace all guaranteed plant material that for any reason fails to meet the requirements of the guarantee. Replacement shall be made with plant material as indicated or specified for the first planting, and all such replacement material shall be guaranteed as specified for the original guaranteed material.

D. Operations Manual: Prepare and submit an operations manual as part of maintenance work at least ten (10) days before the anticipated final acceptance of the project. Final acceptance for the contractors work shall not be given by the City until the operations manual is fully complete and approved by the City. At a minimum, the operations manual shall include manufacturers standard literature, or neatly typed contractor generated information sheets certified and approved by the manufacturer. Two (2) original O&M manuals shall be submitted in a loose leaf binder in sections that mirror the project specification manual. Literature to be submitted shall include, but will not be limited to **ALL** of the following:

E. As Built Plans: It shall be the contractors responsibility to prepare as-built plans which are professionally drafted and approved by the City before full acceptance of the project is given by the City. Final as-built plans shall be professionally drafted by the contractor onto reproducible mylar. Final As-built submittals shall include:

One (1) full size reproducible mylar
Three sets of full size diazo blue lines
One (1) reproducible mylar at 50% size of the original
Three sets of diazo blue lines of the reduction.

The originals and copy's shall clearly be marked with the words AS BUILT PLANS, and marked with the date of preparation.